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Sustainable reduction of antibiotics-induced antimicrobial resistance (ARena) in German ambulatory care

Submission date
24/08/2017

Recruitment status
No longer recruiting

Registration date
13/09/2017

Overall study status
Completed

Last Edited
20/09/2022

Condition category
Infections and Infestations

[_] Prospectively registered
[X] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
Antibiotic resistance remains high on the health agenda. Despite decades of scientific research on the rational use of antibiotics, there remains substantial room for improvement. However, it is not known whether these impacts are sustained over time and achievable in large scale programs. The aim of this study is to optimize the appropriate use of antibiotics in patients with non-complicated infections (upper respiratory tract infections, bronchitis, sinusitis, tonsillitis, and otitis media), community acquired pneumonia and non-complicated cystitis, in order to counter the advance of antibiotic resistance.

Who can participate?
Patients aged over 18, diagnosed with upper respiratory tract infections, acute bronchitis, sinusitis, tonsillitis, otitis media, non-complicated cystitis, or community acquired pneumonia, at participating practices and insured at AOK health insurance in two German federal states (Bavaria and North Rhine-Westphalia)

What does the study involve?
Participating practice networks are randomly allocated to one of three groups and compared with a fourth group that delivers usual care. Each of the three groups gets a different set of quality improvement components. Group A receives a conventional quality improvement program with four components, most of which target physicians. Group B receives the conventional program as well as additional components which target medical assistants and patients in the practices. Group C receives the conventional program and a different set of additional components which target physicians, other medical specialists beyond that and healthcare providers as well. Insurance claims data is collected, and questionnaires, interviews, focus groups and a patient survey are carried out. The use of antibiotics is compared between the groups.

What are the possible benefits and risks of participating?
The quality of healthcare for patients with non-complicated infections will be improved by improving the use of antibiotics in participating practices. This will help to counter the development of antibiotic resistance. The risks are low and harm to participants is not expected.

Where is the study run from?
1. aQua Institute (Germany)
2. University Hospital Heidelberg (Germany)

When is the study starting and how long is it expected to run for?
July 2017 to December 2019

Who is funding the study?
Federal Joint Committee (G-BA), Innovation Fund (Germany)

Who is the main contact?
1. Prof. Joachim Szecsenyi
2. Prof. Michel Wensing

Contact information

Type(s)
Scientific

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Additional identifiers

Protocol serial number
01NVF16008

Study information

Scientific Title
Sustainable reduction of antibiotics-induced antimicrobial resistance (ARena) in German ambulatory care: a cluster randomized trial

Acronym
ARena

Study objectives
The focus in this study is on scaling up and combining existing quality improvement and implementation strategies, therefore it can be hypothesized to achieve sustainable and large-scale uptake of recommended use of antibiotics in ambulatory care in participating practices and practice networks.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Ethics committee of the Medical Faculty Heidelberg, 03/08/2017, ref: S-353/2017

Study design
Non-blinded cluster randomized trial

Primary study design
Interventional

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Non-complicated infections like upper respiratory tract infections, bronchitis, sinusitis, tonsillitis, and otitis media, and community acquired pneumonia and non-complicated cystitis

Interventions
Non-blinded cluster randomized trial with three arms and an added cohort that reflects usual care in 14 practice networks in two German federal states (Bavaria and North Rhine-Westphalia) with an additional process evaluation.

The trial consists of three different intervention arms (A, B and C), where each arm will get a different set of quality improvement components. The 14 participating practice networks are randomly allocated to one of the three interventions arms by independent statisticians and concealed from others in the project.

Intervention group A receives a conventional quality improvement program with four components, most of which target physicians:
1. E-learning on communication with patients for physicians
2. Quality circles with data-based feedback for physicians
3. Information campaigns for the public
4. Performance-based additional reimbursement

Intervention group B receives the conventional program as well as additional components, which target medical assistants and patients in the practices:
5. E-learning on communication with patients for medical assistants
6. Quality circles with data-based feedback for medical assistants
7. Patient information materials

Intervention group C receives the conventional program and a different set of additional components which target physicians, other medical specialists beyond that and healthcare providers as well:
8. Computerised decision support system (CDSS)
9. Quality circles in local multidisciplinary groups
10. Discussion about and feedback on local antimicrobial resistance

All in all the implementation strategy consists of 10 intervention components.

The added cohort that reflects usual care is based on claims-data and will get usual care in the scope of the statutory health care system.

The study is planned for 30 months, with an intervention period of 24 months.

The primary and secondary outcomes are based on pseudonymized claims data and refer to well-established, modified ESAC-Net indicators. Claims data are based on billing data of physicians - like medical prescriptions, diagnoses (ICD-10 codes) and medical service according to the German Einheitlicher Bewertungsmaßstab (EBM), loosely translated as uniform valuation standard for medical services. Additionally, routine data of statutory health insurance will be used: (a) hospital and ambulatory treatments, (b) service of statutory nursing care insurance, and (c) basic claims data. These data are extracted from administrative data at the health insurers involved each quarter year.

Within the process evaluation tailored questions for interviews and questionnaires are used to collect appropriate data. The questionnaires are given to healthcare professionals three times with in the intervention period in month 4 to 6, 10 to 12 and 22-24. Interviews are done in month 10 to 15. Focus groups with general practitioners will be conducted in month 1 to 3, 7 to 9, 13 to 15, 19 to 20, and 25 to 27. Patients in study arm B will be asked to fill out a questionnaire twice within the intervention period in month 4 to 6 and 16 to 18.

Analysis: The evaluation based on claims-data will examine the difference in the usage of antibiotics and compare effects between study arms in generalized equation models. In addition, sensitivity analyses will be done to examine the robustness of the main findings. Descriptive statistics and regression analysis will be used to analyse survey data within the process evaluation. The interview-data will be qualitatively analysed using thematic framework analysis whereas focus group-data will focus on identifying barriers and key topics. The patient survey data will be analysed using descriptive statistics as well as correlation and regression analysis.

Intervention Type
Behavioural

Primary outcome(s)

Antibiotics prescription rate in patients with non-complicated acute infections (upper respiratory tract infections, bronchitis, sinusitis, tonsillitis, and otitis media) within the three intervention arms, extracted from pseudonymized claims data each quarter year

Key secondary outcome(s))

Extracted from pseudonymized claims data each quarter year:
1. Use of antibiotics in ambulatory care in defined daily dose (DDD) per 1000 residents (respectively insured persons) per day and region
2. % of defined daily dose (DDD) of (a) broad-spectrum quinolones of all used antibiotics and (b) broad-spectrum cephalosporins (3rd and 4th generation) of all used antibiotics
3. % of patients (18-75 years) with acute bronchitis, patients (> 18 years) with sinusitis, patients (> 2 years) with otitis media and patients (> 1 year) with upper respiratory tract infections /tonsillitis with a prescription of (a) recommended antibiotics, if necessary at all, but (b) less broad-spectrum antibiotics like quinolones
4. % of women (> 18 years) with a diagnosis of non-complicated cystitis and a prescription of (a) antibiotics, (b) recommended antibiotics but (c) less broad-spectrum antibiotics like quinolones
5. % of patients (18-65 years) with community acquired pneumonia and a prescription of (a) antibiotics, (b) recommended antibiotics, (c) less broad-spectrum antibiotics like quinolones and (d) less broad-spectrum antibiotics like cephalosporins or macrolides
6. % of patients with non-complicated infections who use medical emergency service
7. % of patients with community-acquired pneumonia and hospitalization

The process evaluation covers (a) the uptake and perceived impact of intervention components by participants with a focus on handling patients with non-complicated infections, (b) the perceived impact of contextual factors, particularly those related to practice networks, and (c) perceptions of patients' expectations regarding antibiotics prescribing.

Completion date

01/12/2019

Eligibility

Key inclusion criteria

1. Healthcare professionals need to be part of one of the 14 participating practice networks in Bavaria and North Rhine-Westphalia and belong to one of the following medical specialist groups (Facharztgruppen, FG): GPs (Allgemeinmediziner, Hausarzt, hausätzlich tätiger Internist: FG 01, 02, 03), internists (Internist: FG 23), gynaecologists (Gynäkologe: FG 15, 18), ENT physicans (HNO-Arzt: FG 19), urologists (Urologe: FG 67), respiratory physicians (Pneumologe: FG 30,39,45), and paediatricians (Kinderarzt: FG 34, 40, 46)
2. Patients aged over 18, diagnosed with upper respiratory tract infections, acute bronchitis, sinusitis, tonsillitis, otitis media, non-complicated cystitis, or community acquired pneumonia by physicians in participating ambulatory practices and registered at AOK health insurance in Bavaria or North Rhine-Westphalia, Germany

Participant type(s)

Mixed

Healthy volunteers allowed

No

Age group
Mixed

Sex
All

Key exclusion criteria
Participants younger than 18 years and without German language skills will be excluded from survey and interviews

Date of first enrolment
01/09/2017

Date of final enrolment
30/09/2017

Locations

Countries of recruitment
Germany

Study participating centre
aQua Institute
Goettingen
Germany
37073

Study participating centre
University Hospital Heidelberg
Dept. of General Practice and Health Services Research
Germany
69120

Sponsor information

Organisation
Federal Joint Committee (G-BA), Innovation Fund

ROR
https://ror.org/008c2qm47

Funder(s)

Funder type
Government

Funder Name
Federal Joint Committee (G-BA), Innovation Fund

Results and Publications

Individual participant data (IPD) sharing plan
The data sharing plans for the current study are unknown and will be made available at a later date.

IPD sharing plan summary
Data sharing statement to be made available at a later date

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article	results	05/02/2018		Yes	No
Results article	results	06/01/2020	13/01/2020	Yes	No
Results article	results	14/03/2020	17/03/2020	Yes	No
Results article		12/03/2022	14/03/2022	Yes	No
Results article		08/12/2020	22/08/2022	Yes	No
Results article		26/08/2021	22/08/2022	Yes	No
Results article		24/09/2021	22/08/2022	Yes	No
Results article		19/09/2022	20/09/2022	Yes	No
Protocol article		05/02/2018	22/08/2022	Yes	No
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes
Study website	Study website	11/11/2025	11/11/2025	No	Yes